Changes to the ROD Functional Requirements

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1. Deletions (numbering from version 1.1)

V.A.1.a.4 Synchronization of input data streams ROD & ROD99

ROD99 must provide a mechanism that adjusts the phase of data on each input data stream relative to its clock.

Justification: The relative phase of data on different data streams may vary (e.g. due to different fiber lengths). Input data streams are not synchronized on the Optocard.

Status: Firm, unless it is agreed that this synchronization will be incorporated into the Optocard.

This functionality has been included on the BOC (Optocard).

V.A.1.b.2 No clock degradation ROD & ROD99

ROD99 must not degrade the timing characteristics of the 40MHz bunch crossing (BC) clock transmitted along the crate backplane such that the characteristics do not meet the relevant specifications on the optodriver/receiver clock specified in the document Preliminary Interface Specification: ROD99 to/from Optocard and Preliminary Electrical Interface Specification: Back of Crate Link interface logic.

Justification: ROD99 receives its clock from the same backplane pin

as the Optocard. The Optocard places certain timing requirements upon this clock; therefore, ROD99 must not cause clock degradation beyond the specifications.

Status: Firm

The backplane now routes the clock directly from the TIM to the BOC. The BOC then passes the clock back to the ROD.

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2. Additions (numbering from version 2.0, current)

II.B.3. Multiple event packets from the pixel MCC corresponding to a single L1A from the ROD.

The ROD must be able to receive multiple event packets from an MCC for each L1A command issued. The number of event packets received per L1A issued will not change from event to event without the ROD first being reconfigured. However, the number need not be the same from link to link. The maximum number of event packets received from the MCC will not exceed sixteen.

Justification: The MCC can be configured to transmit multiple L1A commands to the pixel front end chips for each L1A command received from the ROD. In that case, the MCC will transmit a complete event packet to the ROD for each L1A which was issued to the pixel front end chips. The ROD must support this feature. This feature of the MCC will be specified more completely when

the specification of the MCC architecture is completed. This is a work in progress.

Status: The requirement to support this feature is firm. The details, e.g. the maximum number of event packets received for a single L1A transmitted, may change.

This is functionality of the MCC which must be supported.

II.C.1. Transmission of individual event records.

The ROD must be capable of transmitting individual event records with a format specified by the Trigger and DAQ subsystems. When in normal data acquisition mode, for each L1A command received from the ATLAS TTC system, the ROD must transmit an event record to the ROB within a from the ATLAS TTC system, the ROD must transmit an event record latency to be specified by the LVL2 trigger subsystem.

Justification: This is stated in Rule 4.5 of "Trigger and DAQ Interfaces With Front-End Systems: Requirements Document, Version 2.0; DAQ-NO-103."

Status: Firm.

II.C.4.b. Data loss in the ROL path

Data flow in the ROL path must be the same in sample mode as it is in ROL mode. In particular, the data loss tolerances specified in II.C.2 also apply to the ROL path when running in sample mode.

Justification: This is stated in Rule 4.8 of "Trigger and DAQ Interfaces With Front-End Systems: Requirements Document, Version 2.0; DAQ-NO-103."

Status: Firm.

II.C.8. Process event data without output

The ROD must be able to buffer locally a few hundred event records of the expected high luminosity event size at a 100 KHz rate.

Justification: This mode of operation will allow the system behavior to be studied under nominal high luminosity conditions without the need of an S-Link and Readout Buffer.

Status: Firm.

This functionality has been requested by the user community.

II.C.9. Throttling of L1A commands to the detector mounted electronics

The ROD design must support throttling L1A commands to the

detector mounted electronics on a link by link basis.

Justification: Overflow of derandomizing buffers on the detector mounted electronics requires resetting of the readout of these electronics. If conditions are such that these buffers overflow more often than expected data loss may be reduced if the ROD protects these buffers through throttling of L1A commands thereby avoiding the need for reset of the detector mounted electronics. Viewed from the perspective of reducing data loss, throttling would be most useful on a link by link basis.

Note: The design of the detector mounted electronics for both the SCT and the pixel detectors is such that buffer overflows which require a reset are expected to be very rare, even under extreme data taking conditions. For this reason, the throttling feature will be fully implemented on the ROD if the need arises.

Status: Negotiable.

This functionality has been requested by the user community.

II.C.10. Reset of detector mounted electronics

If the ROD performs a corrective action which requires reset of the detector mounted electronics, it must not assert ROD_BUSY during this time. Rather it must continue to transmit event packets over the ROL for each L1A received from the ATLAS TTC system. If data is missing from these packets due to some corrective action which the ROD is performing, appropriate error flags must be set

in the event packet.

Justification: This is stated in Rule 4.10 of "Trigger and DAQ Interfaces With Front-End Systems: Requirements Document, Version 2.0; DAQ-NO-103."

Status: Firm.

II.D.3. Flexibility of fast command sequences

The ROD must allow for flexibility in building fast command sequences. For example, it should be possible to issue L1A commands a fixed time either after a CalStrobe command or after an earlier L1A command which may or may not have been preceeded by a CalStrobe. It should be possible to issue this delayed L1A command to links other than those on which the earlier CalStrobe or L1A was issued.

Justification: This will be an important tool for studying noise in a multimodule system. The ROD should be versatile in the construction of fast command sequences, though exactly what particular tests one will want to perform is difficult to predict.

Status: Negotiable.

This functionality has been requested by the user community.

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3. Other Functional Changes

The ROD VME interface is not required to support broadcast commands.

The ROD must provide some status information, e.g. XON/XOFF and ROD_BUSY statistics.

Sample readout mode added to required modes for the prototype ROD. This is a reflection of the prototyping phase being condensed.

The requirement to have front-panel inputs on the ROD for fast commands has been dropped. The TIM does have front-panel inputs for the fast commands. The ROD is not designed to be used without a TIM except for ROD maintenance. In that case, the on board crystal will be used to generate the clock.
